

## REMARKS

### In the Claims:

Claims 1-14 and 31-42 remain in this application. Claims 15-30 have been canceled.

New claims 39-42 have been added.

### Rejections Under 35 U.S.C. 103(a):

Claims 1, 3-6, 10, and 32 were rejected under 35 U.S.C. 103(a) as being unpatentable over Schwiebert, et al. (US 5,672,542) (hereinafter “Schwiebert”) in view of Kato, et al. (US 5,394,490) (hereinafter “Kato”).

### *Cited References Include No Motivation To Combine:*

The rejection of claim 1 should be withdrawn because there is no suggestion or motivation to combine the cited references to result in the method recited in claim 1. A proper *prima facie* rejection under 35 U.S.C. 103(a) requires a suggestion or motivation within the cited prior art or within the knowledge generally available to one of ordinary skill in the art to combine references or modify a reference (MPEP 706.02(j), 2143; *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)). Schwiebert does not contain any suggestion to use its solder bumps with waveguides. Thus, there is no suggestion or motivation within Schwiebert to make a combination with Kato. Similarly, Kato discloses conductive bumps of its own that function with waveguides and does not provide any indication that different bumps may be needed or desirable. Thus, there is no suggestion or motivation for one of skill in the art to combine Kato and Schwiebert to result in the method recited in claim 1.

### *Examiner Fails To Present Motivation To Combine:*

Because the only argument the Examiner asserts as providing a suggestion or motivation is a statement that it would be *possible* to combine the references, the rejection does not meet the requirements of a proper *prima facie* rejection under 35 U.S.C. 103(a) and should be withdrawn. The fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination (MPEP 2143.01; *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)). Yet, this is exactly the argument the Examiner makes in the rejection. The Examiner stated that one of ordinary skill in the art would use the waveguide of Kato with the method of Schwiebert, “since the optical waveguide interconnections easily integrate with flip chip electrodes.” (Office Action, page 3.) This statement does not provide a suggestion or motivation to combine the two references. Rather, it merely states that the two references *can* be combined easily, which is exactly the sort of rejection that, under *In re Mills*, is not proper. The statement ignores the requirement that the Examiner show *why* one of skill in the art would be motivated make such a combination. Since the Examiner has not provided a suggestion or motivation to combine the references, the Examiner has failed to make a proper *prima facie* rejection.

*Examiner Relies On Prohibited Hindsight In Making Rejection:*

Because the cited references provide no motivation or suggestion to combine the references and because the Examiner has failed to present any motivation or suggestion to combine the references, the Examiner’s rejection can only be based upon using Applicants’ own claim as a cookbook for combining elements, something that is not allowed in making a rejection under 35 U.S.C. 103(a); the rejection is unsupported by the references or the law and should be withdrawn. A suggestion or motivation to combine references must be found in the prior art and not based upon Applicants’ disclosure (MPEP 706.02(j), 2143; *In re*

*Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)). As shown above, the references themselves provide no such suggestion or motivation, and the Examiner has not provided any suggestion or motivation known to one of ordinary skill in the art. Thus, the only suggestion or motivation to combine the references to result in the invention as recited in claim 1 is found within claim 1 itself, something that is not allowed.

Claims 2-14 and 31-33 depend from claim 1. The rejections of claims 2-14 and 31-33 are based upon the Examiner's rejection of claim 1. Since the rejection of claim 1 is improper and should be withdrawn, the rejections of claims 2-14 and 31-33 should also be withdrawn.

While Applicants believe this response is sufficient, selected additional reasons why rejections should be withdrawn are provided below.

Claims 7 and 8 were rejected under 35 U.S.C. 103(a) as being unpatentable over Schwiebert in view of Kato, and further in view of Berndlmaier, et al. (US 5,059,553) (hereinafter "Berndlmaier").

Both Kato and Schwiebert use solder bumps to make connections. Schwiebert is concerned with making solder bumps (see Title, Abstract). Schwiebert makes these solder bumps by placing a mask on a substrate (col. 6, lines 25-33), depositing a paste that includes solder into holes in the mask (col. 7, lines 61-65; col. 8, lines 11-26), and then melting the solder so it coalesces into a single solder bump (col. 9, lines 53-57). Similarly, Kato melts solder bumps to connect a chip to a substrate (col. 7, lines 52-53; col. 7 line 64 through col. 8 line 1).

Berndlmaier, in contrast, is concerned with thermo compression bonding and how to prevent this bonding method from damaging other structures (see Title, Figures 1-3, col. 4, lines 57-59). The conductive bump in thermo compression bonding is not melted, but is

subjected to heat and pressure. This thermo compression bonding is a completely different method of bonding than melting solder, and requires different technologies and structures.

The Examiner stated that, “it would have been obvious to a person of ordinary skill in the art at the time of the invention to use the protection and barrier layers of Berndlmaier with the method of Schwiebert and Kato in order to provide oxidation resistance and corrosion resistance, respectively.” Element 44 of Berndlmaier, which the Examiner characterized as a protection layer, is actually a bonding surface (col. 3, lines 50-53) used in the thermo compression bond (col. 4, lines 23-28). Since Schwiebert and Kato use melted solder to form bonds, rather than the entirely different technology of thermo compression bonding, there would be no need to use the bonding surface 44 of Berndlmaier with the solder connections of Schwiebert or Kato. One of skill in the art would not make such a combination of different technologies.

Similarly, one of skill in the art would not combine the barrier layer 42 of Berndlmaier with the solder balls of Kato and Schwiebert. The barrier layer 42 of Berndlmaier is used because the thermo compression bond structure includes aluminum and copper that would be next to each other if not for the diffusion barrier (col. 3, lines 59-62). The barrier layer 42 of Berndlmaier prevents formation of an aluminum/copper alloy (col. 3, lines 59-62). Since neither Schwiebert nor Kato includes such aluminum and copper layers close to each other, one of skill in the art would not be concerned about formation of such an aluminum/copper alloy and would not be motivated to include such a barrier layer.

As shown above, because using solder to bond structures and using thermo compression bonding to bond structures are different, one of skill in the art would not be motivated to combine layers used in thermo compression bonds with solder balls. The rejections of claim 7 and 8 should be withdrawn.

Claim 9 was rejected under 35 U.S.C. 103(a) as being unpatentable over Schwiebert in view of Kato, Berndlmaier, and further in view of Brandenburg (US 5,770,477) (hereinafter “Brandenburg”).

As stated above, Berndlmaier is concerned with thermo compression bonding. One of ordinary skill in the art would have no reason to combine the fluxless soldering process of Brandenburg with a thermo compression bond of Berndlmaier. The rejection should be withdrawn.

Claim 31 was rejected under 35 U.S.C. 103(a) as being unpatentable over Schwiebert in view of Kato, and further in view of Makino et al. (US 6,566,239) (hereinafter “Makino”).

The Examiner has characterized the paste layer 334 of Schwiebert as the second conductive layer as recited in the claim. This paste layer of Schwiebert is reflowed into a solder ball (col. 9, lines 53-57). Use of copper (from Makino) as a reflowed material as stated by the Examiner would result in an inoperable device. To reflow copper, the copper must be melted, which requires a temperature of over 1000 degrees Celsius. Such a temperature would destroy the devices (transistors, etc.) of the die upon which the second conductive layer is deposited, and thus destroy the device. Thus, because the Examiner’s proposed combination would render the device inoperable, one of skill in the art would not make such a combination. The rejection should be withdrawn.

Claim 34 was rejected under 35 U.S.C. 103(a) as being unpatentable over Makino in view of Kato.

*Cited References Include No Motivation To Combine:*

The rejection of claim 34 should be withdrawn because there is no suggestion or motivation to combine the cited references to result in the method recited in claim 34. A proper prima facie rejection under 35 U.S.C. 103(a) requires a suggestion or motivation

within the cited prior art or within the knowledge generally available to one of ordinary skill in the art to combine references or modify a reference (MPEP 706.02(j), 2143; *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)). Makino does not contain any suggestion to use its conductors with waveguides. Thus, there is no suggestion or motivation within Makino to make a combination with Kato. Similarly, Kato discloses conductive bumps of its own that function with waveguides. Thus, there is no suggestion or motivation within Kato to make a combination with Makino. Thus, there is no suggestion or motivation for one of skill in the art to combine Kato and Makino to result in the method as recited in claim 34.

*Examiner Fails To Present Motivation To Combine:*

Because the only argument the Examiner asserts as providing a suggestion or motivation is a statement that it would be *possible* to combine the references, the rejection does not meet the requirements of a proper *prima facie* rejection under 35 U.S.C. 103(a) and should be withdrawn. The fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination (MPEP 2143.01; *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990)). Yet, this is exactly the argument the Examiner makes in the rejection.

The only argument the Examiner asserts as providing a suggestion or motivation is merely a statement that it would be *possible* to combine the references. The Examiner stated that one of ordinary skill in the art would use the waveguide of Kato with the method of Makino, “in order to easily integrate optical waveguide interconnections with flip chip electrodes.” (Office Action, page 8.) This statement does not provide a suggestion or motivation to combine the two references. Rather, it merely states that the two references *can* be combined easily, which is exactly the sort of rejection that, under *In re Mills*, is not proper. The statement ignores the requirement that the Examiner show *why* one of skill in

the art would be motivated to make such a combination. Since the Examiner has not provided a suggestion or motivation to combine the references, the Examiner has failed to make a proper *prima facie* rejection.

*Examiner Relies On Prohibited Hindsight In Making Rejection:*

Because the cited references provide no motivation or suggestion to combine the references and because the Examiner has failed to present any motivation or suggestion to combine the references, the Examiner's rejection can only be based upon using Applicants' own claim as a cookbook for combining elements, something that is not allowed in making a rejection under 35 U.S.C. 103(a); the rejection is unsupported by the references or the law and should be withdrawn. A suggestion or motivation to combine references must be found in the prior art and not based upon Applicants' disclosure (MPEP 706.02(j), 2143; *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)). As shown above, the references themselves provide no such suggestion or motivation, and the Examiner has not provided any suggestion or motivation known to one of ordinary skill in the art. Thus, the only suggestion or motivation to combine the references to result in the invention as recited in claim 34 is found within claim 34 itself, something that is not allowed.

Claims 35-38 depend from claim 34. The rejections of claims 35-38 are based upon the Examiner's rejection of claim 34. Since the rejection of claim 34 is improper and should be withdrawn, the rejections of claims 35-38 should also be withdrawn.

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Pursuant to 37 C.F.R. 1.136(a)(3), applicant(s) hereby request and authorize the U.S. Patent and Trademark Office to (1) treat any concurrent or future reply that requires a petition for extension of time as incorporating a petition for extension of time for the appropriate length of time and (2) charge all required fees, including extension of time fees and fees under 37 C.F.R. 1.16 and 1.17, to Deposit Account No. 02-2666.

Respectfully submitted,

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